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FROM THE LARYNX:

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BY VOLTOLINI'S SPONGE METHOD.

A Paper read before the Academy of Medicine,

June 28, 1886,

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FOREIGN bodies of every description are found frequently in the different cavities of the human body, the removal of which is considered the beginning of every therapeutical action. The removal of foreign bodies from the air-passages ought to be attempted in all cases as soon as possible, whether there be a direct danger of suffocation or not; for cases are not infrequently reported in medical journals, where death occurred a long time after the aspiration of foreign bodies. Besides that, statistical investigations favor the operation and condemn the *laissez aller*. According to Durham⁽¹⁾ the mortality in cases of foreign bodies in which operative measures⁽²⁾ were adopted amounted to 24·8 per cent., while the percentage of deaths was 42·5 in a number of cases that were left to themselves.

Very similar results were obtained by Krieger⁽³⁾ of Berlin, who collected 1,614 cases of foreign bodies in the air-passages. According to him the deaths amounted after operation to about 25 per cent., without operation to about 43 per cent.

This having been established, we must consider what must be done when an extraneous substance has found its way into the air-passages. Whenever the symptoms are so urgent that they forbid even a laryngoscopical examination, or, when the foreign body has dropped into the windpipe, tracheotomy is the only thing to be resorted to. However, for all other cases of foreign bodies in the larynx, we should first consider other methods of treatment.

To invert the patient and shake his body is apparently a very uncertain method that may be tried in some cases, especially when the foreign body has a smooth surface and is located in the windpipe. And even in case the foreign body leaves the windpipe it is questionable if it will find its way through the glottis⁽⁴⁾ and not

1. Holmes' System of Surgery, Amer. ed. Vol. I., p. 710.

2. Scil. laryngotomy, tracheotomy, laryngotracheotomy, direct extraction, inversion of body and succussion.

3. Ueber Symptomatologie u. Behandl. fremd. Körp. in d. Luftwegen, Inaug. Diss., Berlin, 1884, p. 28.

4. Koenig, Lehrb. d. spec. Chirurgie, III. Aufl., vol. I., p. 630.

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cause a powerful spasm of the glottis by touching the lower surface of the vocal cords. Besides, J. Solis Cohen⁽¹⁾ claims that "inversion of the body and succussion of the chest and back is liable to the danger of producing impaction of the foreign body." Also J. R. Weist⁽²⁾ of Richmond, Ind., calls this method dangerous, unless the windpipe has been first opened, basing his conclusions on the study of one thousand cases of foreign bodies in the air-passages. The same author rejects the use of emetics, these being of no value for the removal of the foreign body, and only apt to increase the suffering of the patients.

L. Blau⁽³⁾ of Berlin, suggests to try the removal of foreign substances by coughing, vomiting or sneezing only when they are liquid and not to waste time by using these methods whenever the foreign bodies are of a solid nature.

Gross, in his classical monograph, "Foreign Bodies in the Air-Passages," says that, though sometimes emetics may have proved successful, there is no confidence in them, as little as in inversion or in nature's own efforts; and that frequently much valuable time is lost in waiting for their effects⁽⁴⁾; and in order to prove this he gives a table⁽⁵⁾ of forty-six cases in which the use of emetics was not successful. In fact, it is scarcely to be understood how emetics should be able to remove an extraneous body impacted in the air-passages, since they even fail to expel adherent diphtheritic membranes from the larynx. I myself am thoroughly convinced of this latter fact, as was also suggested in this Academy of Medicine, some months ago, by Dr. Ransohoff in his paper, "Tracheotomy in Diphtheritic Croup."⁽⁶⁾ On the contrary, the emetics will very often have the effect that the extraneous body, through the contraction of the larynx, will be still more impacted⁽⁷⁾, a danger, which, after J. Solis Cohen⁽⁸⁾ presents "a serious objection⁽⁹⁾ to their use."

In addition to the thyrotomy and tracheotomy we therefore have only the endolaryngeal operation to fall back upon. One can easily understand why the same has not been used or has even been directly rejected before the invention of the laryngoscope, as it has been done by the great surgeon, Johann Friedrich Dieffenbach⁽¹⁰⁾, who called this operation "impracticable." But this is not to be wondered at when we find that this very same ingenious, bold, and successful surgeon wrote about the extirpation of the ovary as follows⁽¹¹⁾: "The same may be said of this operation as of the extirpation of the womb: neither the patient nor the

1. Diseases of the Throat and Nasal Passages, Philadelphia, 1879, p. 619.

2. Transactions of the American Surgical Association, Phila., 1883, I. p. 129, and Internat. Centralbl. f. Laryngologie, vol. I., p. 25.

3. Diagnose u. Therapie b. gefahrdrohend. Krankheitssymptomen. Leipzig, 1883, p. 86.

4. Gross, A Practical Treatise on Foreign Bodies in the Air-Passages. Phila.: 1854. p. 183.

5. Loc. cit., p. 197.

6. The Cincinnati LANCET-CLINIC, January 23, 1886, p. 110.

7. See Gottstein, die Krankh. des Kehlkopfs. Wien, 1884, p. 153.

8. Loc. cit.

9. See Koenig, loc. cit.

10. Die Operative Chirurgie. Leipzig: 1845, vol. I., p. 28.

11. Op. cit. Leipzig: 1848, vol. II., p. 802.

physician is benefitted thereby. The inexperienced, bold but young physician may be easily induced to perform it, but the man of experience will be deterred from it, for he knows what the system will stand and what not." Scarcely twenty-five years had elapsed and ovariectomy had taken a place among those operations which no skillful surgeon or gynecologist would refuse to make. The same is the case with the endolaryngeal operations, after the late Victor von Bruns had in 1861 performed the first operation for a polypus in the larynx *per vias naturales*. Since that time the endolaryngeal removal of foreign bodies, which, next to the removal of neoplastic growths, Schrötter⁽¹⁾ claims to be the most brilliant achievement of laryngeal surgery, has become an operation generally acknowledged and performed by every laryngoscopist. Therefore, we are at least justified in all cases of foreign bodies, the location of which permits an endolaryngeal operation, to make an attempt to remove it in that manner, with the exception, of course, of those cases where instantaneous suffocation threatens. Morell Mackenzie⁽²⁾ also recommends this procedure as the first step in the removal of foreign bodies from the larynx.

We should use in laryngeal surgery the rules adopted for conservative surgery. Viewed from this standpoint we are surprised that this operation has lately been totally rejected by some authors, for instance by Krieger⁽³⁾, in the following thesis: "The endolaryngeal operation for the removal of foreign bodies from the air-passages is generally not to be recommended." He attempts to prove his assertion by quoting a number of cases where even experienced laryngoscopists failed to extract the foreign body *per vias naturales*⁽⁴⁾; that, after all, the windpipe had subsequently to be opened, and that, in addition to the difficulties of this operation, the danger of an instantaneous suffocation deters one from performing it, so that the surgeon should always be prepared with the instruments necessary for performing tracheotomy.

As to the difficulties of the endolaryngeal operation, the same has of late been diminished for those who are in the least expert in laryngoscopic technicalities, by the introduction of cocaine into therapeutics. Yet, I admit that even twenty per cent. solutions of cocaine at times do not produce the desired effect as has been stated by many authorities, and which I have myself seen in Stoerk's clinic at Vienna, and have been able to corroborate in two striking cases occurring in my own practice. But even without cocaine it is frequently possible to operate within the laryngeal cavity, as was done up to about two years ago, so that I deem it, by all means, advisable to try, in proper cases first, the endolaryngeal removal of foreign substances from the larynx. We can thereby avoid, in a great many cases, the far more serious operation of thyrotomy or tracheotomy. And in those rare cases where we do not succeed by the endolaryngeal method, these latter operations will remain as our last resort. In order to be prepared for the instantaneous performing of the same, in case a sudden danger of suffocation

1. Laryngolog. Mittheilungen. Wien, 1875, p. 86.

2. Diseases of the Throat and Nose, Amer. ed., vol. I., p. 404

3. Loc. cit., p. 31.

4. Loc. cit., p. 14 and 15.

should arise while we attempt the endolaryngeal operation, we should have the instruments for tracheotomy on hand, as has been advised before Krieger by other authors as well⁽¹⁾.

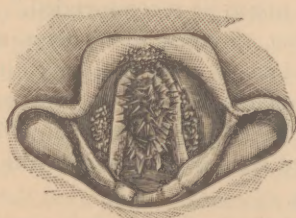
The following case will prove that, even in difficult cases, the endolaryngeal method sometimes may be advantageously used.

Geo. G——, æt. 16, was sent to me by Dr. Aub on the 26th of December, 1885. Patient stated that on the previous day he had swallowed a "burr," and that since that time he had suffered from a steadily increasing difficulty in breathing and great pain in swallowing, in consequence of which pain he had not eaten anything for twenty-four hours. Emetics had been used without benefit; tracheotomy had been subsequently recommended, but was refused. I could not obtain any more of the history at this time, on account of the condition the patient was in.

Stat. præ: Patient apparently in considerable dyspnoea; breathes with loud inspiratory noise. Voice very rough, nearly aphonic, face pale, mouth open.

Pharynx red, slightly swollen.

Larynx entirely filled with frothy, blood-stained, muco-purulent secretion. This having been removed by a vigorous coughing spell, I saw the following condition :



Between the anterior two-thirds of the vocal cords, a dark, apparently oval body is located; the posterior part of same projects plainly into the lumen of the larynx, backwards and upwards, the anterior part being located below the anterior commissure. The body, covered with muco-purulent discharge, is fringed in every direction with numerous prickles of various length. There is not the least change of position to be seen during the respiratory movements. The mucous membrane of the whole larynx, and especially of the ventricular bands, is deeply red and considerably swollen. Upon the latter, on both sides, ulcers, covered with a yellowish detritus, are to be seen, which are very narrow at the anterior part, but get broader towards the posterior part, to about the size of a pea, and which cease at the posterior end of the foreign body, exactly corresponding to those places which are brought in contact with the body during the strangling and respiratory movements. Such an ulcer presents itself in a longitudinal shape on the laryngeal surface of the epiglottis, directly on the cushion of the same. The vocal

1. For instance by Trendelenburg, quoted from Koenig, loc. cit.; Sander, *Deutsches Archiv f. Klin. Medicin.*, vol. XVI., p. 367.

cords are partially separated and covered by the foreign body during respiration, and during phonation they also gape, while the arytenoid cartilages approximate in normal manner. The visible portion of the vocal cords is red, swollen and rough. The space of the glottis free for respiration has scarcely the width of a common lead-pencil. Pressure on the outside of the larynx is very painful, likewise any attempt to swallow, even liquid or saliva, which latter is secreted very freely.

Though I was very well aware that the endolaryngeal operation for the removal of the foreign substance would probably meet with some difficulty on account of its location and formation, I determined to attempt it. The larynx and pharynx were brushed several times vigorously with an alcoholic twenty per cent. solution of hydrochlorate of cocaine, as recommended by Jelinek (!); then the sensitiveness and the reflex irritability having been entirely relieved, an attempt at extraction was made with Schrötter's laryngeal tube forceps of medium size. The foreign body was caught, but the forceps slipped off at once. In this and some of the subsequent attempts at extraction, the patient felt considerable pain radiating from both sides of the larynx toward the ears, which proves that the local anæsthesia in the laryngeal mucous membrane did not destroy the radiation of pain in the nerv. laryng. sup. and nerv. auricularis vagi. An attempt with the largest Schrötter's forceps failed in the same manner. I subsequently tried Mackenzie's laryngeal forceps of different forms, as well the lateral as the antero-posterior forceps with serrated blades, and I repeated the attempts after having reapplied the cocaine solution, but with the same result. The cause of these vain attempts was that by far the smallest part of the foreign body was projecting free into the lumen of the larynx, and this was round and slippery, being covered all over with muco-purulent discharge; while the larger part was located below the vocal cords; part was impacted into the vocal cords and ventricular bands by numerous little prickles.

I was now convinced that the attempts at extraction would only force the thorns deeper into the soft parts of the larynx, and therefore decided to use no more forceps, the impossibility of grasping the burr by the sides having been sufficiently demonstrated. After all these failures with instruments, generally used with good results for the removal of foreign bodies from the larynx, tracheotomy seemed to be inevitable, the patient having become considerably exhausted and dyspnoic. But there still remained one hope of succeeding by the endolaryngeal method, and that consisted in getting an instrument behind and below the foreign body. For this purpose I used a sponge instrument of Voltolini. With this instrument I had removed a fibroid polypus, situated in the anterior angle of the vocal cords and inserted in the lower surface of the same, but a short time before. The instrument carried a small, cylindrical sponge of about the size of a bean, around which a strong silk thread had been wrapped in order to make its surface still more rough. The thread served at the same time to fasten the sponge, and was attached to the handle of the instrument. This instrument I introduced, with the aid of the

laryngoscope, of course, very cautiously into the larynx behind the foreign body, in order to avoid pushing the same down into the trachea. The sponge filling the yet available space for breathing of the larynx, caused a terrible paroxysm of suffocation. A quick movement of the instrument was made downward below the burr and then forward; then a rapid and vigorous upward movement dislodged the *corpus delicti*, so that it flew to a considerable distance out of the oral cavity. Patient was at once freed from his dyspnoea.

Duration of the operation about thirty minutes.

The *stat. præ.* was now: The whole of the laryngeal mucous membrane red and swollen. An oblong ulcer of about half the size of a bean on the laryngeal surface of the epiglottis; on the ventricular bands, extending from the anterior insertion of the vocal cords to about the processus vocales of the arytenoid cartilages, the ulcers above mentioned. The vocal cords gape during phonation widely; they are swollen and red, and deprived partially of their epithelium. In the middle of their edges, small ulcers. Action of the arytenoid cartilages normal. In the trachea, at the anterior wall, a lengthy ulcer of about half the size of a bean, directly below the anterior angle of the vocal cords. Pressure upon the larynx and swallowing slightly painful. Patient perfectly aphonic.

The after treatment consisted in the inhalation of an antiseptic solution and daily insufflations of iodoform and boric acid, aa p. aequ. The sensitiveness of the larynx disappeared in a few days, the ulcers healed soon, and in about ten days the vocal cords closed completely during phonation, and the voice was entirely restored. A chronic laryngitis, yet remaining, was treated in the usual manner.

The removed foreign body, which I now present you, had an ovoid shape; its greatest length was 17 mm.; its greatest width, 13 mm.; the average length of its thorns, of which none were broken, and only a few were bent, was 3 mm.; the two longest and strongest were 5 mm. long. It is a so-called cocklebur, German *Spitzklette* or *Knopf-klette*, of *Xanthium strumarium* (Linné).

It was now, of course, a matter of interest to learn how a foreign body of this form and shape could get so deeply into the laryngeal cavity, for you would think *a priori* that the stiff thorns would have arrested the burr before it could get to the rima glottidis, although cases as those of Johnson and Schrötter, where a toy-engine⁽¹⁾ and a set of artificial teeth⁽²⁾ got below the vocal cords, prove that bodies larger in every diameter than the diameter of the glottis, can get below it.

I afterwards learned, that, while the patient was hunting rabbits, and running rapidly, he opened his mouth to take a deep breath; at that moment the wind, against which he was running, blew a burr, which are found in great numbers in this vicinity, into his mouth. Subsequently, in trying to spit it out, he by inhalation, drew it deeper into his larynx. A spell of suffocation followed, and in order to get it out he introduced the index finger of his right hand into his throat, but only succeeded in pushing the burr further downward.

1. See Morell Mackenzie, loc. cit., p. 400.

2. Schrötter, loc. cit.

As to the method with the aid of which I removed the cocklebur, I will mention that it was devised by Voltolini⁽¹⁾ in 1877, for the operation of certain neoplastic growths in the larynx, but has, up to the present time, been adopted by but few of the laryngoscopists. The operation is performed as follows: A sponge, the size of which, of course, must be changed each time according to the case, is attached to a strong laryngeal probe; the same must not be too elastic, because it would otherwise be very easily bent during the manipulations. This instrument is introduced into the larynx by the aid of the laryngoscope. Then attempts to remove the neoplastic growth are made by vigorous, rubbing movements, while the patient or an assistant holds the tongue tightly. Otherwise the larynx descends and the instrument slips out of it. For the removal of foreign bodies this instrument, as far as I am able to ascertain, has been recommended only by Schadowaldt⁽²⁾ in his report of the successful removal of a star-shaped shoe buckle from the larynx. In this operation, however, he used a hook-shaped laryngeal probe, but suggests the adaptability of Voltolini's sponge instrument for the removal of foreign bodies from the larynx in some cases. At the time I operated by this method I had not read this article.

DISCUSSION.

DR. LONGSTREET TAYLOR said that although death frequently results suddenly from the presence of a foreign body in the larynx, yet numerous cases are on record in which the foreign bodies have remained fixed in the larynx for a comparatively long period without causing great distress.

In Langenbeck's *Archives of Surgery*, Vol. 18, the following peculiar case is related. A woman in drinking impure water swallowed a small leech which fastened itself in the interior of the larynx on the posterior wall, above the cords. The leech did not belong to the class used as medical leeches, which drop off as soon as they have filled themselves, but to a variety which remain fixed, and from time to time fill themselves with the blood of their host. This leech caused very alarming symptoms, but its presence was not suspected until a laryngoscopist was called fourteen days after the accident. Attempts were then made to extract the leech with a pair of laryngeal forceps, but as the jaws of the forceps could not grasp the entire circumference of the body without irritating the interior of the larynx and thus causing reflex laryngeal spasm, the attempts were unsuccessful. The leech was able to free itself every time it was grasped by its contractile power. Finally the operator was able to draw the leech out of the larynx and hold it in the pharynx until the assistant had grasped it with a pair of polypus forceps, when it was pulled away entire. It was probably the same difficulty that was experienced in this operation, that prevented the essayist from firmly fixing this burr in his forceps. That is the reflex muscular spasm, produced by the irritation of the mucous membrane by the branches of the forceps, putting an end to all manifestations, as everyone knows who has had any experience in operating in the interior of the larynx. This burr from its position encroached on the mucous membrane on

1. Monatschr. f. Ohrenheilk., etc., 1877, Nos. 2, 3 and 8.

2. Deutsche Med. Wochenschr., 1884, p. 779.

three sides, and thus its removal was practically impossible with forceps, as they could only grasp a small part of the periphery without being forced between the burr and the mucous membrane, and hence a secure hold could not be obtained.

The speaker thought that the essayist should be congratulated for the brilliant manner in which he had overcome this obstacle.

DR. THORNER, in conclusion, said: It is a well-known fact that foreign bodies located in the lower part of the larynx and partially in the trachea, being impacted between the vocal cords, generally produce the least danger of instantaneous suffocation. We find it quoted by most authors who have written on this subject. Immediate suffocation threatens only in such cases where the foreign body covers entirely the rima glottidis. It will be remembered, however, in the case presented this evening, there was a space the width of a lead-pencil free for respiration. Clinical observation has demonstrated the fact that such a space is not infrequently sufficient for respiration for far more than twenty-four hours.

That I did not succeed in the various attempts at extraction is readily understood. The nature of the foreign body was such that impaction in the mucous membrane was absolute, preventing not only its dislodgment in the various manipulations for extraction by the forceps, but for the same reason preventing its being pushed downward.

As the preceding speaker has already stated, it is impossible to operate within the laryngeal cavity with the forceps with the same facility that may be brought to bear outside of it. The operator cannot open the branches very far, especially not in the small larynx presented by this boy. On the other hand, the instrument used, entirely on the inspiration of the moment, proved its admirable adaptation by the success following its use. It enabled me to bring the broad, rough surface of the sponge in contact with the broad posterior end of the burr, the two surfaces nicely adjusting themselves, the numerous prickles of the burr twining into the meshes of the sponge, so that it required only a forcible, backward movement to dislodge the burr from its position.

That the foreign body could find its way so deeply into the laryngeal cavity has been explained in the history of the case, but to those following closely the literature of the subject, many instances are known of foreign bodies of larger diameter below the vocal cords, in addition to those quoted in my paper.

